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ABSTRACT

The development of the College of DuPage's (CDP's) business mathematics course for delivery on CDP's FM radio station took place in four phases. After business mathematics was selected for radio delivery, tentative course specifications were written and discussed by a development team consisting of a mathematics instructor, a script writer from the radio-television production staff, and the Director of Instructional Design. Next, a study guide and script were prepared and reviewed by the mathematics and business faculties. The final phase was testing and validation. Course development required the preparation of various instructional materials: (1) a study guide consisting of 20 units, each to be covered during one 30-minute broadcast, and providing an overview, topic outline, unit objectives, list of key terms and concepts, reference list, unit outline, and homework exercises; (2) scripts, based on the study guide materials, in which a husband and wife study the unit together, helping each other and applying the problems to their daily lives; (3) supplementary materials; and (4) 4 tests covering the units. The course is coordinated by the CDP Learning Center which keeps student records, provides tutoring, maintains copies of the broadcasts, and serves as a testing center. A compatible development test, the use of good pedagogy and broadcast and production techniques, faculty involvement, sufficient time, adequate support staff, and a varied delivery process were keys to the development of an effective course. (KL)

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MATHEMATICS ON THE RADIO

(You have got to be kidding)

by

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Although radio has been with us for some time, it has not been used extensively as a vehicle for delivery of educational course work. Television has received most of the attention of educators. But, for colleges that operate a radio station, radio has become an attractive alternative. In a time of shrinking budgets, the lower costs of operation and development have led to an increased interest in radio as a medium of instruction.

Nevertheless, when confronted with developing a mathematics course for radio delivery, most would respond as indicated by the title of this paper. But, after the initial doubt fades, the challenge of the task can become irresistable.

The College of DuPage is a community college located in the western suburbs of Chicago. It is a large multi-purpose institution enrolling more than 20,000 students each quarter in a variety of pre-baccalaureate and technical/occupational programs. The college operates its own FM radio station and is committed to serve district residents with community service broadcasting. A natural outgrowth of this policy is the delivery of college courses via radio. The purpose of this paper is to describe the development and implementation of a mathematics course, Business Mathematics, for radio delivery.

THE DEVELOPMENT

The development of Business Mathematics for radio delivery was composed of four rather distinct phases. First, the concept of a mathematics course for radio was developed. The Dean of Academic Alternatives, the Director of Instructional Design, and radio station personnel discussed the possibility of course development for radio delivery. Following the discussion, Business Mathematics was selected and tentative specifications for the course were written by the Director of Instructional Design.

Second, a development team was assembled from the staff of the College of DuPage. For this project, three people were selected: a mathematics faculty member as subject matter specialist, a staff member from the radio and television production area as script writer, and the Director of Instructional Design as coordinator. The tentative specifications for the course were discussed with the development team and modified based on the critique of the script writer and the subject matter specialist.

Third, the instructional materials were prepared. The subject matter specialist was assigned the responsibility of preparing the Study Guide and acted as liaison with collegues of the mathematics faculty. The script writer created the format for the radio broadcasts and prepared the scripts based on the Study Guide materials. The scripts were reviewed by the subject matter specialist for content validity. Finally, the Director of Instructional Design assumed overall coordination, provided clerical support, and granted final approval of the materials produced.

The fourth and final phase consisted of testing and validation. To assure that the instructional materials were accurate and of acceptable quality, they were assessed by an outside expert. In this case, a member of the business faculty of the College of DuPage was asked to read the Study Guide and to make suggestions for revision. In addition, the subject matter specialist discussed the content of the course with the full time mathematics faculty. They approved the course outline before the course was developed for radio delivery. Finally, the completed course was field tested with a section of about 25 students. Comments from students were solicited and used as a basis for revision.

THE PRODUCT

To deliver a course by radio requires a unique set of instructional materials. For this course, the development team decided that a Study Guide and a set of broadcast tapes would be needed. Also, it was decided that twenty instructional units would adequately cover the topics in the course outline, and that a 30 minute radio broadcast would accompany each unit. This would allow students to study two units each week during an academic quarter. In what follows, the format of the Study Guide and the radio broadcasts will be described.

The Study Guide

The Study Guide was written by the subject matter specialist. It included those required and optional topics as specified by the course outline of the College of DuPage. Each of the 20 units followed a standard format as approved by the development team and consisted of the following parts:

1. The Overview - The overview is a one or two sentence description of the content of the unit.

2. The Topic Outline - This consists of a list of the specific mathematical topics of the unit.

3. The Unit Objectives - This is a list of performance objectives that specify the expectations for student learning for this unit.

4. The Key Terms and Concepts - This section is a list of important terms and concepts of the unit. The terms are defined, and the concepts are illustrated.

5. The Reference List - This is a list of supplementary materials to which the students can refer for help and/or additional information. For most units the reference materials are a chapter or section of a textbook, or selected modules of a slide-tape series. The text is available for purchase, and the slide-tape modules may be viewed in one of the Learning Centers.

6. Handout to Accompany the Broadcast -- This section is designed for two purposes. First, it contains explanations of the concepts to be learned and examples illustrating the concepts. Second, the section is designed to provide a reference while students listen to the broadcast. As the students listen to the broadcast, they can follow along in this section of the Study Guide.

7. Homework Exercises - This consists of a set of problems designed to provide students with practice on the concepts and problem-solving methods of the unit.

The Radio Broadcast

The design and production of the 20 radio broadcasts was the responsibility of the script writer. Every effort was made to design and produce broadcasts that used good pedagogy as well as the most effective broadcast techniques.

After a unit of the Study Guide was completed, it was reviewed by the script writer. Then a script was written based on the section of the Study Guide. "Handout to Accompany the Broadcast." The script writer and the subject matter specialist conferred frequently while the script was being prepared. The subject matter specialist read the script and, where necessary, made suggestions for revision. Finally, the script was prepared for broadcast by the production staff of the College of DuPage.

The radio broadcasts have several features which are noteworthy. First, the broadcasts are closely coordinated with the Study Guide. While listening to the broadcast, students follow along in the Study Guide and see the problem solutions and the concepts being described in the broadcast. This encourages students to be actively involved in the learning process.

Second, an interesting and provocative format was developed by the script writer. The scripts were prepared so that during each unit a husband and wife studied the unit. In some units the wife taught the husband, while in other units the roles were reversed. They struggled together through the course. Also, the topics of the course lended themselves to everyday application. So, every effort was made to place the topics of the unit in the context of the lives of the husband and wife.

Third, the scripts were prepared taking into consideration the learning process of the listener. Thus, in each broadcast, instruction takes place for about 5 to 7 minutes followed by a short break for chit-chat or humor. Then, the instruction continues for another 5 to 7 minutes. This allows the student to listen comfortably and to catch up if he/she falls behind.

Supplementary Materials

In addition to the Study Guide and the radio broadcasts, students have access to various supplementary materials. They consist of a hardcover textbook, and a slide-tape series. In the reference list of each unit of the Study Guide, students are referred to the appropriate chapter(s) of the textbooks and module(s) of a slide-tape series. The textbooks are available for purchase and the slide-tape series may be viewed in the Learning Centers.

Finally, a set of tests was prepared to assess student learning. Two forms of 4 tests were prepared. The 4 tests cover all the material in the 20 units of the Study Guide.

THE DELIVERY

Business Mathematics - a Radio Course, was designed to be an individualized course. This means that within the constraints of an academic quarter, students are allowed to progress at their own pace. The purpose of this section is to briefly describe the delivery process currently in use at College of DuPage.

About two weeks before the beginning of the quarter, students receive a letter. This letter describes the course requirements and the learning process. Also, students are provided with a schedule of radio broadcasts, and a suggested study program. Students are expected to finish the course in one quarter, but additional time (a quarter) is granted if satisfactory progress is shown. Finally, the letter provides information about grading procedures and the academic regulations of the college.

The course is administered through the Learning Center on the main campus. However, students may register at one of several neighborhood satellite Learning Centers as well. The Learning Centers provide a place where student records are maintained and where the supplementary materials are housed. Also, students take their tests in the Learning Centers. Should they miss a radio broadcast, duplicate tapes are available in the Learning Centers. But, the most important function of the Learning Center is to provide assistance for students. Mathematics instructors are on duty regularly so that students can drop in without appointment. The instructor can help students with concepts and problem solving. Instructors can also discuss test results with students.

After an initial field test, Business Mathematics has been offered for three quarters. To date, more than 200 students have enrolled. When asked to evaluate the course, students have expressed satisfaction with the instructional materials and with the delivery process. Students who are homebound or who are unable to attend regularly scheduled classes have been especially complimentary.

WHAT DID WE LEARN?

The development of a course for a relatively new medium is always a learning experience. The following five items will be of interest to those who plan to develop courses by radio.

1. Assemble A Compatible Development Team - The development and production of a course for radio requires diverse talents. It is impossible to do it alone. Thus, the team concept is an appealing alternative. But, the team must be chosen carefully. Team members should be from the full time faculty and staff, professionally and personally compatible, and respected by their colleagues.

2. Use Good Pedagogy - During each phase of development and production it is important to remember that an academic course is being developed. One must not forget that the materials must be designed to help student accomplish their educational goals. The medium must not overpower the content and process of learning.

3. Use Good Broadcast Techniques - The medium, radio in this case, must be used to its fullest extent as an instructional tool. Hence, every effort was made to create an attractive format. Also, the programs were structured so that instructional segments of 5-7 minutes were contrasted with humor and chit-chat.

4. Use Good Production Techniques - It is important that they conform to the standards of the academic discipline of which they are a part. Thus, the materials developed for this course were read by another full time faculty member competent in the area. In addition, the materials were field tested for one quarter with one class of students.

5. Try to Anticipate Problems - Before and during the development process, the team should carefully analyze the task. The following are offered as suggestions to eliminate potential problems:

   - Work closely with full time faculty.
   - Plan for enough time to develop a high quality course.
   - Create instructional materials to meet student needs.
   - Provide supplementary materials for students who need extra help.
   - Use a delivery process that allows for variance in student needs.
   - Provide enough clerical staff to support the development process.

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